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Research paper

Transforming provider-customer relationships in digital servitization: A relational view on digitalization

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ABSTRACT

Digitalization is viewed as a source of future competitiveness due to its potential for unlocking new value-creation and revenue-generation opportunities. To profit from digitalization, providers and customers tend to move away from transactional product-centric model to relational service-oriented engagement. This relational transformation is brought about through digital servitization. However, current knowledge about how providers and customers transform their relationship to achieve benefits from digital servitization is lacking. This paper addresses that knowledge gap by applying the relational view theory to a study of four provider-customer relationships engaged in digital servitization. The results provide evidence for four relational components – complementary digitalization capabilities, relation-specific digital assets, digitally enabled knowledge-sharing routines, and partnership governance – that enable providers and customers to profit from digital servitization. A key contribution is the development of a relational transformation framework for digital servitization that provides an overview of how the four relational components evolve as the relationship progresses. In doing so, we contribute to the emerging servitization literature by offering key relational insights into the interdependence of activities throughout the transformation phases of provider-customer relationships in digital servitization.

1. Introduction

> We have realized that we need to progress on these issues as we enter digitalization – how do we procure value and how do we work together with our key suppliers? We have thousands of suppliers and all cannot be treated the same – how can we work with our most important partners to increase value creation?
>
> (Chief Procurement Officer of a large mining company)

Digitalization is viewed by industry and academia as a source of future competitiveness due to its potential for new value-creation and revenue-generation opportunities. Specifically, digital technologies such as the internet of things, remote monitoring (Grubic, 2014), big data analytics, and artificial intelligence are expected to enable manufacturing companies to undergo the servitization transition from being a product provider to a solutions provider (Hasselblatt, Huikkola, Kohtamäki, & Nickell, 2018; Kohtamäki, Parida, Oghazi, Gebauer, & Baines, 2019). This rising trend is encapsulated in the concept of *digital servitization*, formally described as the provision of digital services embedded in a physical product (Holmström & Partanen, 2014; Vendrell-Herrero & Wilson James, 2017). One example is ABB's offering of a remote optimization service through its collaborative operations centers for gearless mill drives, which allows it to capitalize on its technological expertise by leveraging the efficiencies of digital technology. Typically, product providers adopt a digital servitization strategy to differentiate themselves from competitors (Opresnik & Taisch, 2015) and to create new revenue streams by establishing closer collaboration with their customers (Scherer, Kloeckner, Ribeiro, Pezzotta, & Pirola, 2016). However, despite the considerable investment in offering digital services, many companies struggle to create real customer value, and both providers and customers ultimately fail to secure a financial return on their investment (Gebauer, Fleisch, & Friedli, 2005; Kastalli & Van Looy, 2013; Pagoropoulos, Maier, & McAloone, 2017; Suarez, Cusumano, & Kahl, 2013).

Digitalization combined with servitization significantly transforms provider–customer relationships; and a key challenge for companies pursuing digital servitization is to adapt and revise existing product-centric relationships Lerch & Gotsch, 2015; Pagoropoulos et al., 2017; (Sjödin, Parida, Jovanovic, & Visnjic, 2020). This is so because digital services require providers to take on greater responsibility for the core processes of the customer (Lerch & Gotsch, 2015) by shifting from transactional to relational interaction (Reim, Sjödin, & Parida, 2018;

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Sousa & da Silveira, 2017). Therefore, digital servitization tends to create closer provider–customer relationships characterized by co-creation logic, long-term commitment, and greater investment in the relationship. Consider a mining equipment provider that goes from selling excavators and haulers to offering site management and optimization of the customer's mining operations. In a case like this, it becomes necessary for both provider and customer to move away from a transactional product-centric model to relational engagement, where the provider works in close collaboration to fulfill the customer's business goals and achieve operational efficiency.

However, the transition to reciprocal long-term relationships is not always easy as, for many companies, this is a step into unknown territory. For example, companies may struggle with numerous relational issues such as how to balance risk and reward (Reim et al., 2018), how to find the appropriate level of customization, and how to ensure transparency, share data, and integrate digital systems (Coreynen, Matthyssens, & Van Bockhaven, 2017). This underscores the need to investigate and understand *how providers and customers transform their relationships in digital servitization*. Accordingly, this study targets two research gaps.

First, prior studies have placed the dominant focus on the provider perspective, with limited insights into the relational aspect (Raddats, Kowalkowski, Benedettini, Burton, & Gebauer, 2019; Sjödin, Parida, & Wincent, 2016) and how customer organizations must work closely with providers to adapt and, thus, derive benefits from digital technologies (Pagoropoulos et al., 2017). Consequently, this study adopts the theoretical lens of the relational view suggested by Dyer and Singh (1998) to better understand how provider and customer relationships facilitate the transformation to digital servitization. Indeed, since this transformation requires engagement and intensive collaboration between provider and customer (Story, Raddats, Burton, Zolkiewski, & Baines, 2017; Valtakoski, 2017), it is important to understand the requirements of both sides in the partnership. For example, to procure a digital service, such as site management, requires a completely different evaluation process where the value parameter places emphasis on outcome guarantees rather than product features. Consequently, it is necessary to include the less-studied customer perspective to understand the new relational requirements that emerge during digital servitization (Coreynen et al., 2017; Holmlund, Kowalkowski, & Biggemann, 2016; Tuli, Kohli, & Bharadwaj, 2007; Valtakoski, 2017).

Second, there is a lack of knowledge concerning how provider–customer relationships transform and evolve through digital servitization. Whilst the significance of digital transformation is well established (Ardolino et al., 2018; Porter & Heppelmann, 2015), only a few studies have addressed it from a dynamic relational perspective. Lerch and Gotsch (2015) have stressed that attempts to offer models dealing with the transformation to advanced digital services have been few. In response, they developed a model that encompasses four generic stages of a company's transformation path from manufacturer to provider of digitalized product–service systems (Lerch & Gotsch, 2014). However, their model highlights only the provider's transformation journey. A need, therefore, remains to study the transformation of the provider–customer relationship so that the key activities and the dynamics between partners are better understood (Bharadwaj, El Sawy, Pavlou, & Venkatraman, 2013). Arguably, the dynamics in these types of relationship are very different from traditional provider–customer relationships and, therefore, many unforeseen relational challenges can be expected (Reim et al., 2018). However, the change in relational dynamics between providers and customers remains an under-researched topic in the servitization literature – a deficiency that is increasingly acknowledged (Huang & Chiu, 2018; Reim et al., 2018; Schuh, Klotzbach, & Gaus, 2008; Sjödin et al., 2016; Sundin, Öhrwall Rönnbäck, & Sakao, 2010).

This study targets these research gaps by applying the relational view (Dyer & Singh, 1998; Dyer, Singh, & Hesterly, 2018) to increase understanding of *how providers and customers transform their relationships in digital servitization*. It builds on the case studies of four dyadic relationships between customers and providers in different industries that have undergone digital servitization. The dyadic cases studied illustrate relational transformation and generate valuable insights into how this transformation is exploited through digital service offerings.

This study contributes to the servitization literature by putting provider–customer relationships in focus and adopting a novel theoretical lens based on the relational view (Dyer, Singh, & Hesterly, 2018; Dyer & Singh, 1998). This means we also address the call to include and develop relevant theoretical perspectives when studying servitization (Kowalkowski, Gebauer, & Oliva, 2017; Rabetino, Harmsen, Kohtamäki, & Sihvonen, 2018). In addition, we shed light on the emergence of digital servitization, which adds another level of complexity to advanced service provision. Current mainstream servitization literature has just begun to study how firms can benefit from digital servitization. This enables us to add novel knowledge on how provider–customer relationships evolve in the specific context of digital servitization and become transformative, with the explicit goal of creating greater value for both parties.

2. Theoretical background

2.1. Digital servitization

Research has demonstrated a strong interconnection between digitalization and servitization (Gago & Rubalcaba, 2007; Lerch & Gotsch, 2015). The literature points to the fact that digitalization is both a driver and an enabler of servitization (Kohtamäki et al., 2019; Rust & Huang, 2014; Vendrell-Herrero, Bustinza, Parry, & Georgantzis, 2017). The usage of digital technologies empowers various types of servitization and service innovation (Gago & Rubalcaba, 2007). Digitalization has actually stimulated companies to move from product-centric models to digital service-oriented offerings (Adrodegari & Saccani, 2017; Ardolino et al., 2018; Rust & Huang, 2014). Iansiti and Lakhani (2014) argue that digital transformation changes the customer's value proposition; it alters how a company creates and captures value since digitalization principally involves the provision of services. The opportunities to expand services increase when companies synchronize digitalization, connectivity, and data analytics (Martín-Peña, Díaz-Garrido, & Sánchez-López, 2018).

A research sub-stream in the servitization literature has been named ‘digital servitization’. It can be defined as “the transformation in processes, capabilities, and offerings within industrial firms and their associated ecosystems to progressively create, deliver, and capture increased service value arising from a broad range of enabling digital technologies such as the Internet of Things (IoT), big data, artificial intelligence (AI), and cloud computing” (Sjödin, Parida, Kohtamäki, & Wincent, 2020). Digital servitization involves the utilization of digital tools for transforming a product-centric business model to a service-centric logic ((Sklyar et al., 2019)). This owes to the evolution of ‘smart, connected products’ – a combination of hardware, software, sensors, data storage, and connectivity – which have transformed manufacturing companies (Porter & Heppelmann, 2014; Porter & Heppelmann, 2015). An example of digital services is remote monitoring, which is considered a key enabler of servitization since it is vital to remotely monitor the product's location, condition and use (Baines & Lightfoot, 2013; Ulaga & Reinartz, 2011). Through remote monitoring and diagnostics, the company can preemptively repair a machine prior to failure, rather than reactively mend it after it has shut down (Allmendinger & Lombreglia, 2005). Through connecting digital and physical systems, remote services create the opportunity to provide availability guarantees, for example (Lerch & Gotsch, 2015). Nevertheless, digital servitization creates both opportunities and challenges for companies thus engaged.

It is worth noting that digital opportunities arise at a speed that many companies are unable to cope with expeditiously. Consequently,

companies need to embark on an efficient digital transformation that allows them to take full advantage of digitalization and servitization. However, many companies struggle with digital transformation because it requires a change in provider–customer relationships whereby new and innovative approaches need to be adopted (Iansiti & Lakhani, 2014). These relationships should be looked at in a dynamic rather than a static way in order to maximize value for both parties. However, there are few insights in the literature on how provider–customer relationships should be transformed in the context of digital servitization. Iansiti and Lakhani (2014) note that a transformation journey can go through three phases in the search for increased value. First, it starts as a transactional relationship between provider and customer. Second, it evolves into a contractual relationship, where the risk is shared and the total cost of ownership is reduced. Third, the relationship develops further with expanded customer outcomes as assets and operations are optimized using data and analytics. However, knowledge is lacking on how to achieve the objectives of each phase, and how to move from one phase to the next. In other words, we need a better understanding of what aspects ought to be considered throughout this transformation in order to attain high relational value. This provides the primary motivation for studying digital servitization from a relational view.

2.2. A relational view on digital servitization

This study applies the theoretical perspective of the relational view (Dyer, Singh, & Hesterly, 2018; Dyer & Singh, 1998) to the study of digital servitization relationships. A relational viewpoint argues that competitive advantage is a result of mutually adapted inter-firm relations and the joint input of partners (Dyer & Singh, 1998; Lavie, 2006), which enables companies to co-evolve so that relational rents are generated. Although competition between companies might still be the general rule, firms that integrate their resources in a distinctive way may secure greater advantage compared to competing firms unable or unwilling to do so (Dyer & Singh, 1998).

The importance of a relational view is particularly relevant in the context of digital servitization (Cenamor, Sjödin, & Parida, 2017; Eloranta & Turunen, 2015) because the implementation of integrated products and services can only succeed when both provider and customer deploy them, and not simply because a provider delivers them (Tuli et al., 2007). Thus, providing this kind of service can be seen as a 'longitudinal relational process' between provider and customer (Storbacka, Windahl, Nenonen, & Salonen, 2013). Digital services are significantly transforming inter-firm relationships and influencing governance patterns across companies (Bharadwaj et al., 2013). Providers wish to increase customer value, and so they integrate themselves into their customers' business processes (Matthyssens & Vandenbempt, 2008). A major issue in a servitization transformation is the quality of interaction between provider and customer so that customized and comprehensive solutions that offer real value are provided (Kohtamäki, Partanen, Parida, & Wincent, 2013; Lerch & Gotsch, 2015; Reim, Parida, & Örtqvist, 2015; Viljakainen & Toivonen, 2014). The closeness and quality of this interaction is key to value co-creation Grönroos & Voima, 2013; (Sjödin, 2019) because the development of customized solutions needs a collaborative innovation approach as well as connected production resources shared between partners (Martín-Peña et al., 2018).

This study follows Dyer and Singh (1998) who suggest four determinants of inter-organizational competitive advantage: *complementary resources and capabilities, relation-specific assets, knowledge-sharing routines, and effective governance*. We argue that these determinants hold significant explanatory potential for understanding how inter-firm relationships are transformed through digital servitization. Indeed, as Dyer and Singh (1998) suggest, these determinants can generate relational rents or the "supernormal profit jointly generated in an exchange relationship that cannot be generated by either company in isolation and can only be created through the joint idiosyncratic contributions of the specific alliance partners" (Dyer & Singh, 1998, p. 662). However, these relational rents will not remain static over time, especially in times of industrial disruption such as the current digitalization of industry. Thus, it is important that partners dynamically consider these determinants in order to create and capture value over time (Dyer, Singh, & Hesterly, 2018), and to be able to capitalize on emerging digitalization opportunities (Sjödin, Parida, Leksell, & Petrovic, 2018). In the paragraphs that follow, we describe these four determinants of the relational view and how they may be conceptualized in the context of digital servitization.

First, Dyer, Singh, & Hesterly, 2018 argue that access to *complementary resources and capabilities* is considered the initial rationale in forming a partnership. In this case, the marginal return on a partner's resources increases in the presence of resources from the other partner (Hess & Rothaermel, 2011; Milgrom & Roberts, 1995). Dyer and Singh argue that "the greater the proportion is of synergy-sensitive resources owned by alliance partners that, when combined, increase the degree to which the resources are valuable, rare, and difficult to imitate, the greater the potential will be to generate relational rents" (1998, p. 667). Partnerships allow companies to acquire assets, competences or capabilities – in particular, specialized expertise (Oliver, 1997). Having competences, experience and knowledge are essential in implementing digital technologies (Ardolino et al., 2018; Cenamor et al., 2017). So, when companies do not have the necessary capabilities or resources, they tend to fill the gap by partnering with other companies. Research has shown that value is co-created by providers and customers through integrating their resources and exploiting their shared competences (Grönroos, 2011; Grönroos & Voima, 2013; Vargo, Maglio, & Akaka, 2008). Customers typically seek to involve providers in operations outside their own core competences (Sjödin et al., 2018). However, research on digitalization capabilities has concentrated on the provider's perspective e.g. (Sjödin, Parida, & Kohtamäki, 2016), with only limited consideration given to the customer's viewpoint. Lenka, Parida, and Wincent (2017), for instance, highlight the digitalization capabilities that providers must develop in order to interact and co-create value with their customers; intelligence capability, connect capability, and analytic capability. However, there is limited research on how a company's capabilities complement its partners' capacities and resources within digital servitization (Pagoropoulos et al., 2017). Again, the importance of looking at this aspect from the perspective of a relational view is stressed.

Second, Dyer and Singh argue that "the greater the alliance partners' investment is in *relation-specific assets*, the greater the potential will be for relational rents" (1998, p. 664). These assets are usually specialized and are considered to be of strategic importance for the relationship – necessary conditions for generating relational rent (Amit & Schoemaker, 1993). Williamson (1985) names three types of asset specificity. First, site specificity, which refers to locating successive production stages close to one another. Second, physical asset specificity, which refers to transaction-specific or tailored capital investments such as customized machinery. Third, human asset specificity, which refers to transaction-specific know-how that can be garnered from long-term relationships and staff dedicated to those relationships. Provision of advanced services naturally involves investing in relation-specific investments and co-specialized assets. For instance, Sjödin et al. (2016) discuss the importance of building knowledge about partner operations and roles to clarify and redefine relationships. In terms of digital servitization, the more digital intensity increases within a company's business strategy, the more likely its scaling options will be based on a partnership with other companies by means of shared digital assets (Bharadwaj et al., 2013). Offering availability guarantees for machines and plants, for example, requires linking customer plants to the provider's digital architecture through a compatible communication network (Lerch & Gotsch, 2015). Yet, how relation-specific digital assets evolve throughout the relationship needs to be investigated by further research.

Third, Dyer and Singh emphasize that "the greater the alliance partners' investment is in inter-firm *knowledge-sharing routines*, the greater the potential will be for relational rents" (1998, p. 665). They define knowledge-sharing routines as a regular pattern of interactions between companies that allow specialized knowledge to be transferred, recombined, or created (Grant, 1996). In other words, they are purposefully designed processes to facilitate knowledge exchange between partners. In the digital era, technologies allow companies to easily communicate and share in-depth information and knowledge through digital means (Gago & Rubalcaba, 2007; Martín-Peña et al., 2018). However, it is not given that this translates into enhanced knowledge sharing or performance. Information overload is a common term for paralysis arising from too much data that is hard to prioritize and decode. These problems are increasing in digitalization where the cost of additional data collection is next to none. Thus, the use of data is a key aspect to consider as digitalization lays the foundation for translating digital data into knowledge (Barney, Wright, & Ketchen Jr, 2001) and leads to improved transparency and better-informed decision making (Ness, Swift, Ranasinghe, Xing, & Soebarto, 2015). Thus, digitalization can enable innovation by facilitating knowledge exchange and absorptive capacity between actors (Barrett, Davidson, Prabhu, & Vargo, 2015; Carlo, Lyytinen, & Rose, 2012; Joshi, Chi, Datta, & Han, 2010; Slaughter & Kirsch, 2006). It is obviously not feasible to have employees aggregate and analyze the real-time data generated from smart machinery, such as the physical location of a product or the temperature of a component. Instead, this is enabled by digital services that depend on 'machine intelligence' where data points are automatically gathered, validated, stored, and turned into information that can be acted on (Allmendinger & Lombreglia, 2005). What really matters is transforming this data into valuable insights and actions (Lenka et al., 2017). However, further research is needed to understand how partners must work together in this endeavor.

Fourth, in recent developments on the relational view (Dyer, Singh, & Hesterly, 2018), the *effective governance* of relationships is regarded as the key differentiator that allows the development of the other determinants. Governance can be considered the safeguard used by partners to enforce what they have agreed, and it is intimately connected to all other determinants of relational rents that partners must govern as part of their relationship (Dyer, Singh, & Hesterly, 2018; Dyer & Singh, 1998). Dyer and Singh (1998) differentiate between two classes of governance. The first is governance that depends on 'third-party enforcement' of agreements, such as legal contracts where the state, for example, can be the third-party enforcer in the event of dispute. The second class of governance depends on 'self-enforcing' agreements, where no third party intervenes. Self-enforcement can be either through 'formal' safeguards such as financial penalties (Reim et al., 2018; Williamson, 1983), or by 'informal' safeguards such as goodwill, trust (Gulati, 1995; Powell, 1990; Uzzi, 1997) and reputation (Larson, 1992; Weigelt & Camerer, 1988). Generally, self-enforcing mechanisms are more effective than third-party enforcement (Dyer & Singh, 1998) because they enable greater flexibility and innovation in the relationship (Kohtamäki et al., 2013; Reim et al., 2018). Yet, partnerships mostly start with formal mechanisms and then gradually adopt more informal means as the relationship develops (Gulati, 1995). Dyer and Singh suggest that "the greater the alliance partners' ability to align transactions with governance structures in a discriminating (transaction cost minimizing and value maximizing) way, the greater the potential will be for relational rents" (1998, p. 669). In the context of digital servitization, Svahn, Mathiassen, and Lindgren (2017) argue that a key paradox experienced by companies relates to governance – that is, achieving balance between control versus flexibility during the transformation process. As digital servitization is largely based on innovation, there is a major need to balance new opportunities and established practices, and governance mechanisms should enable creativity and exploration of digital opportunities (Svahn et al., 2017). Sarker, Sarker, Sahaym, and Bjørn-Andersen (2012) also stress that governance mechanisms are considered one of the enablers and inhibitors of value co-creation between partners, especially in the information technology context that they studied. The servitization literature lays particular stress on the importance of self-reinforcing mechanisms, such as mutual trust and the extent of partner commitment, since these reduce bureaucratic complexity and, in consequence, transaction costs (Reim et al., 2018; Sjödin et al., 2016). However, the authors do not disregard the role of contractual agreements since they help to combat opportunism by explicitly stating terms, conditions, and responsibilities in the partnership – hence, leading to more effective value co-creation (Park & Ungson, 2001; Poppo & Zenger, 2002; Reuer & Arino, 2007; Sjödin et al., 2016). Nevertheless, digital servitization contracts should not replicate traditional cost-control contracts. Initiatives should be taken to develop new generic contracts that emphasize mutual liability and incentives for co-creating digital services with partners (Svahn et al., 2017), while maintaining acceptable control over value appropriation (Boudreau, 2010). Although the literature underscores the importance of maintaining a balance between control and flexibility in governing digital servitization partnerships, there is scant knowledge on how this balance should be fostered as the relationship matures over time.

In short, we consider the relational view to be a very useful theoretical lens to study how a provider–customer relationship is transformed in the context of digital servitization. The relational view offers a better, and more dynamic, theoretical lens compared to the resource-based view (e.g. Dyer, Singh, & Hesterly, 2018). Although the resource-based view highlights how a company maintains its competitive advantage by obtaining valuable, rare, inimitable, and non-substitutable resources (Barney, 1991), it does not address the fact that these resources can extend beyond the boundaries of a single company and can be combined with a partner's resources. Given the speed of development in the digital era, it is clear that no company can keep pace on its own (Bogers, Chesbrough, & Moedas, 2018). Hence, the relationship between providers and customers is an important unit of analysis in examining value creation and profit maximization (Dyer & Singh, 1998) in digital servitization. As the partnership transforms over time, this study aims to research how each of the four determinants of relational rent evolves throughout the relationship.

3. Research methods

3.1. Research approach and case selection

This study is based on an exploratory multiple case study (Yin, 2009) of four business-to-business (B2B) dyadic relationships between providers and customers of digital services. The study seeks to shed light on how their relationships transform over time in the context of digital servitization. Hence, the unit of analysis is the dyadic relationship between two companies. We decided to apply a multiple case study approach as it is commonly used in the industrial marketing research domain (Halinen & Törnroos, 2005). This case study approach makes it possible to mobilize multiple observations on complex relational processes (Eisenhardt, 1989; Eisenhardt & Graebner, 2007), which are particularly useful in developing new insights into theoretically novel phenomena (Edmondson & McManus, 2007), such as how providers and customers transform their relationships in digital servitization. Thus, the possibility of obtaining versatile and complementary insights is opened up.

Building on recommendations suggested by Glaser and Strauss (1967), we opted for theoretical sampling in order to select cases that would illuminate how companies transform their relationships when undergoing digital servitization (Suddaby, 2006). The case selection criteria were informed by the study's research question: how do providers and customers transform their relationship in digital servitization? The question highlights three aspects: the context of digital servitization, the transformation of the relationship, and the dyadic

provider–customer relationship. Accordingly, the case selection criteria are as follows.

First, we selected globally active Swedish providers and customers engaged in longstanding relationships in digital servitization. The selected companies represent diverse industries – namely manufacturing, telecom, forestry, energy, and mining industries – which provides the opportunity to contrast various industrial perspectives on relational processes.

Second, these relationships have been developing over time with notable progress. All cases are similar in the sense that they underwent a transformation from product-centric models to digital service-oriented offerings, thus facilitating the study of how they evolve and transform. So, a key selection criterion was the ability of the provider and customer to vividly describe the relationship trajectory and provide in-depth information about the relationship and its key activities, supported by documents and background information.

Third, we selected cases where we had established good contacts with both provider and customer in the relationship due to the ongoing nature of the research project, as this made for rich data collection. Unlike other studies that ignore the customer perspective, we followed the example of Tuli et al. (2007) in collecting dyadic data (i.e. from both customer and provider views) on the evolution of the relationship, enabling us to gain a deeper understanding of the interactive relationships relevant to the digital servitization context.

3.2. Data collection

Data for the present study was gathered primarily through individual, in-depth interviews with participants in the four relationships. We developed a semi-structured interview tool for our interviews. The unit of analysis was the relationship between provider and customer. Therefore, we undertook interviews with numerous managers from both the customer and the provider sides of the relationship. To do so, we organized separate interviews with each informant.

In total, 40 informants were interviewed from all cases. We began by interviewing key informants – senior executives from case companies – who were actively involved in the relationship. Additional informants were identified by using a snowballing technique where key informants were asked to recommend people who had an active role in the relationship and were able to describe how the relationship had progressed. To capture a multifaceted view, we interviewed individuals exercising various functional roles for providers and customers engaged in the relationships. This was deemed necessary since digital servitization relationships typically require complex interactions between multiple organizational functions. The informants interviewed included business developers, R&D managers, project managers, production managers, product managers, plus maintenance and technical support staff. This allowed us to obtain a wider understanding of the cases from different perspectives. Table 1 gives an overview of the cases and the positions of company informants interviewed.

Informants were asked open-ended questions with the support of an interview guide (example of interview questions can be found in Appendix 1). The guide was based on themes about digital servitization, value co-creation between provider and customer, and how business relationships start and evolve over time. For example, informants were asked to consider questions relating to broad themes such as ‘How did the digital servitization relationships evolve?’, ‘Which activities are critical in facilitating digital servitization?’, and ‘How was the relationship governed?’. In seeking answers to these overarching questions, we encouraged informants to base their answers not only on the relationships studied but also on their broader experience so that empirical comparisons were facilitated. Follow-up questions were asked for clarification and to obtain further details, which allowed further exploration of interesting relevant cases. The interview guide was also revised continuously as we derived new insights from the interviews and secondary data – thus, increasing relevance and deepening

Table 1
Overview of studied relationships, companies and informants.

Case	Relationship description	Company pseudonym	Industry	No. of employees	Informants
R1	Joint effort to connect and integrate Beta's fleet of Alpha's machines and control systems to identify optimization opportunities and facilitate increased service level	Alpha *(Provider)*	Power & automation technology	7800	Total: 6 *(2 account managers; 2 business development managers; 1 head of service center; 1 service & support manager)*
		Beta *(Customer)*	Mining	5700	Total: 9 *(1 chief procurement officer; 1 head of procurement development; 3 procurement managers; 1 R&D manager; 1 automation manager; 1 technology development engineer; 1 maintenance manager)*
R2	Joint efforts to connect and integrate information from Gamma's overall production and distribution network to visualize system performance and identify improvements	Alpha *(Provider)*	Power & automation technology	7800	Total: 2 *(1 digitalization manager; 1 product manager)*
		Gamma *(Customer)*	Energy & utilities	700	Total: 3 *(2 IT project leaders; 1 strategy manager)*
R3	Joint development of a digital service platform and a predictive maintenance service offer to use data and analytics to lower lifecycle costs	Delta *(Provider)*	Machinery manufacturing	600	Total: 8 *(1 marketing manager; 3 sales managers; 2 service business planning managers; 2 technical managers)*
		Epsilon *(Customer)*	Forestry	4100	Total: 6 *(1 chief technical officer; 2 technical managers; 2 business development managers; 1 production manager)*
R4	Partnership designed to implement the latest technology and digital solutions and continuously improve network operations	Zeta *(Provider)*	Telecom equipment	12,700	Total: 4 *(1 business models researcher; 1 head of strategy & business development; 1 commercial management director; 1 business operations manager)*
		Eta *(Customer)*	Telecom	17,700	Total: 2 *(1 business development manager; 1 contract manager)*

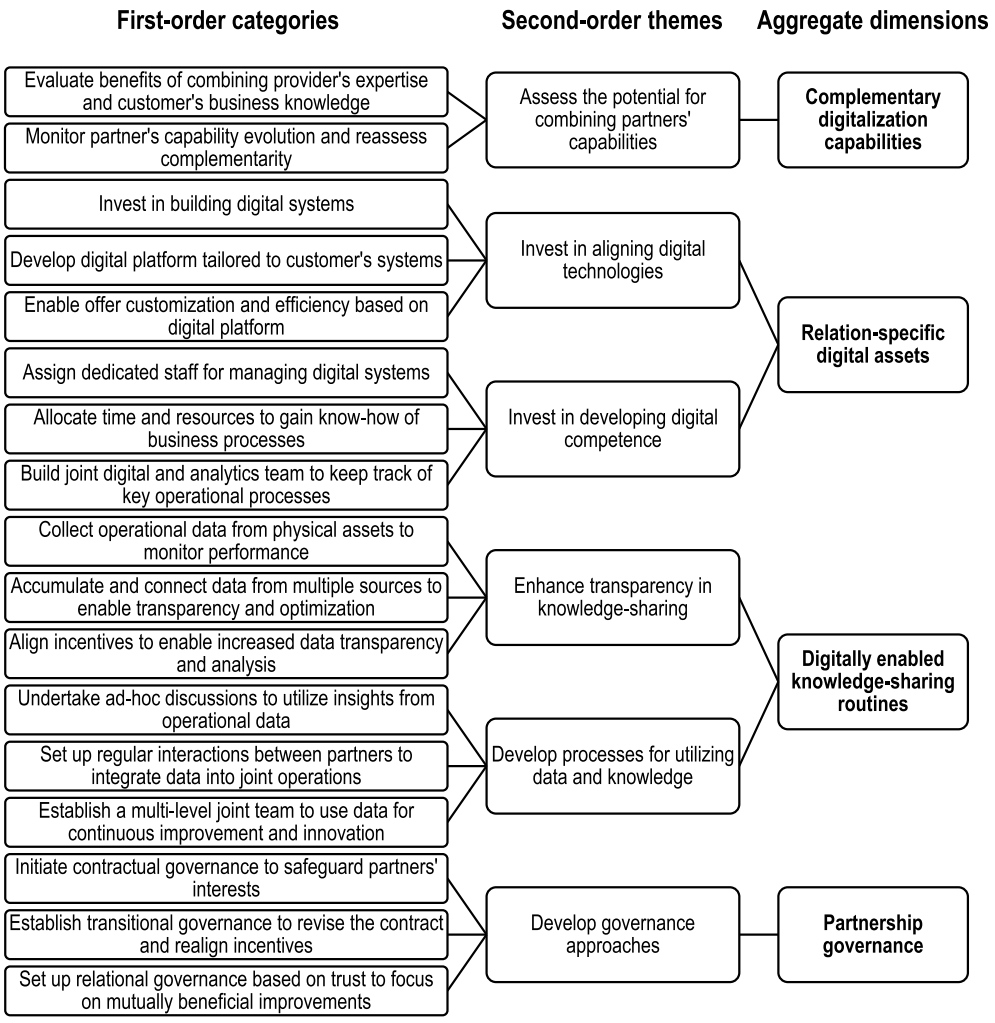

Fig. 1. Data structure and coding process.

understanding. Interviews took approximately 60–120 min each. All interviews were recorded and transcribed, and transcripts provided the basis for data analysis.

We triangulated our data by applying multiple data-collection techniques, including multiple interviews and a review of documents (Jick, 1979). Multiple data sources were also leveraged to distinguish phases of the relationship; data represented multiple periods of time although they were all collected contemporaneously. We reviewed company reports, agreements, and project documents to validate and provide context to our informants' views, thus enabling empirical triangulation. For example, an updated documented process of Beta on how to interact with suppliers when aiming to develop digital service offerings validated and helped to refine initial codes that had been derived from interviews. This was also studied in comparison to previous practices of interaction with suppliers.

By using multiple sources of evidence – i.e. both different informants and different secondary sources – we were able to increase construct validity since these insights gave a nuanced picture of the phenomenon studied and the conclusions to be drawn (Yin, 2009). The initial results of the study were presented to a number of informants from case companies in order to increase validity. Only minor revisions were introduced during these interactions. Furthermore, to increase reliability and enhance transparency, as well as the possibility of replication, a case-study protocol with emphasis on field procedures and case-study questions was constructed along with a case-study database. The aim was to keep track of the process and allow multiple researchers to collect and analyze data. The database included physical and digital material such as case-study notes, documents, and analysis.

3.3. Data analysis

The data analysis was based on a thematic analysis approach, which provides ways to identify patterns in a large and complex dataset (Braun & Clarke, 2006). Moreover, it provides a means to effectively and accurately identify links within analytical themes. Through a series of iterations and comparisons, it is possible to identify themes and overarching dimensions so that an empirically grounded framework can be developed. In doing so, we followed a three-step process similar to that described in recent literature. Data was coded into categories following a thematic analysis approach; these were then clustered into second-order themes, which were converged into aggregate dimensions (Braun & Clarke, 2006; Gioia, Corley, & Hamilton, 2013). A more detailed description of these steps is included below.

The first step in our data analysis focused on an in-depth analysis of raw data (e.g. interview transcripts). This analysis focused on reading every interview several times, and marking phrases and passages related to the overarching research purpose. By coding the common words, phrases, terms, and labels mentioned by informants, it was possible to identify first-order categories of codes, which express the views of the informants in their own words. This was facilitated by MAXQDA software and resulted in first-order categories.

The second step of the analysis built on the first-order categories

Table 2
Overview of the relational transformation in studied digital servitization relationships.

Case	Complementary digitalization capabilities	Relation-specific digital assets	Digitally enabled knowledge-sharing routines	Partnership governance
R1 Alpha *(provider)* Beta *(customer)*	▪ Beta's knowledge on mining processes was complemented with Alpha's knowledge on digital mining equipment and control systems. ▪ Complementarity was reassessed for each new project.	FOUNDATIONAL PHASE Digital infrastructure was built and connected with Alpha's equipment and systems, which were managed by dedicated engineers.	Data was collected from equipment through IoT. Discussions and feedback among operators and engineers took place to explore how to act upon it.	Responsibilities and rights were meticulously formalized in the contract with high control level.
		INTERMEDIATE PHASE Alpha tailored a digital platform that connects smoothly to Beta's systems, and further resources were allocated to reexamine on-site processes.	Data from all machines was connected and accumulated in an interface for benchmarking their performance and impact on each other. Daily operational meetings and monthly/quarterly managerial meetings were set.	Revision of the contract and experiments with different contractual models based on 'gain/pain sharing' logic.
		ADVANCED PHASE Digital platform was further developed to enable customized operational solutions assessed by a team of data scientists.	Alpha and Beta exchanged information for further fleet optimization to the benefit of both. A joint analysis team suggested improvement opportunities to management.	Performance-based contract and a joint development strategy for more advanced digital services.
R2 Alpha *(provider)* Gamma *(customer)*	▪ Gamma's knowledge on grid management was complemented with Alpha's digital expertise for developing the system. ▪ Complementarity was monitored through pilot projects.	FOUNDATIONAL PHASE Alpha's applications were built on Gamma's digital systems, and designated engineers were assigned for collaborative operations.	Database was established for collecting data from machines to track their activity and monitor the energy system's status. Ad-hoc discussions were held for improving processes.	The details of the collaboration model were defined in the contract.
		INTERMEDIATE PHASE Digital platform was developed based on Gamma's needs, and a cooperative digitalization center was established.	Data was accumulated from all machines for condition-based maintenance and optimization. Managerial discussions of joint operations were held semi-annually.	Contract revised to redefine performance indicators and realign goals and incentives.
		ADVANCED PHASE Digital platform was further developed to enable identifying operational problems such as positions of water leakages. A joint team was established for developing solutions.	The data of the Alpha's wider fleet of machines supplemented Gamma's data to identify further improvement opportunities, which were evaluated and implemented by joint teams.	Joint governance through a steering group that sets long-term strategic directions and a joint budget.
R3 Delta *(provider)* Epsilon *(customer)*	▪ Epsilon's knowledge on cost efficiency of logging was complemented with Delta's technical expertise on efficient use of smart machinery. ▪ Complementarity was reassessed for ensuring machines' and operators' efficiency.	FOUNDATIONAL PHASE All machines were equipped with sensors to connect the whole machinery fleet, and dedicated machine instructors were assigned.	The installed software and hardware enabled the monitoring of machines' performance and calibration. Ad-hoc discussions of production efficiency.	Contract was set up based on product sales and after sales service package. Goals and follow-up mechanisms were specified in the contract.
		INTERMEDIATE PHASE All machines were connected to one digital platform for handling operations, and staff were assigned for assessing operations' efficiency.	Data was accumulated from diverse machines of different brands for facilitating better site management. Performance improvement was discussed between Epsilon's operators and Delta's mechanics semi-annually.	Product relationship was transformed to a service contract, enabling proactive maintenance and improved machine performance. Prices waere revised accordingly.
		ADVANCED PHASE Machine optimization services were launched based on insights from the digital platform that were analyzed by a joint operational control team.	Delta's data was integrated with Epsilon's data and used for operator training program and digital service package. A joint team regularly discussed opportunities for further data integration and analyzed latest innovations in forestry industry.	*Re*-evaluation of the relationship to build mutual understanding and trust, with a focus on outcomes rather than the contract in itself.

(*continued on next page*)

Table 2 (*continued*)

Case	Complementary digitalization capabilities	Relation-specific digital assets	Digitally enabled knowledge-sharing routines	Partnership governance
R4 *Zeta (provider)* Eta *(customer)*	■ Eta's business knowledge was complemented with Zeta's knowledge on efficient use of telecom equipment. ■ Complementarity was monitored through regular follow up meetings.	FOUNDATIONAL PHASE Investment in installing base stations and digital systems. The Zeta assigned dedicated staff for establishing processes and service intervals. INTERMEDIATE PHASE Digital platform was developed for connecting all operational systems. Resources were allocated to develop digital and business capabilities. ADVANCED PHASE The digital platform became a central part for improving network operations and Zeta was given freedom to design customized digital solutions which were reviewed by a joint collaborative center.	Data was collected to understand how to run network operations efficiently. Discussions on capacity improvements were undertaken in unstructured manner. Data from all operational systems were accumulated and connected to derive insights for optimizing operations, which were discussed and analyzed in formalized regular interactions. Further data transparency was encouraged by open discussion on the expectations and needs of each party. A joint team of staff from diverse functions worked together for continuous evaluation and improvement.	Boundary conditions and back-stops were identified and incorporated into the contract. A 'reward-penalty' logic was incorporated into the contract to align incentives. Emphasis on relational benefits and maintaining a win-win in contract implementation.

and used further analysis to discover links and patterns within them. This iterative process led to the formation of second-order themes that represent theoretically distinct concepts created by combining first-order categories. Our analysis identified 6 second-order themes, which were at a higher level of abstraction compared to the first-order categories. These themes relate to various approaches that enable the relationships to progress. In accordance with validity claims in the literature, the themes were further refined, based on insights from prior literature as well as data from interviews and secondary sources such as internal documents, presentations, newspapers, and company websites (Kumar, Stern, & Anderson, 1993). This step of the data analysis was conducted conjointly by the authors, who thoroughly discussed the data structure.

The third step involved the generation of aggregate dimensions that represented a still-higher level of abstraction in the coding. Similar to other studies (e.g. Einola, Kohtamäki, Parida, & Wincent, 2017; Lenka, Parida, Sjödin, & Wincent, 2018; Reim, Sjödin, & Parida, 2019) that followed the approach of Gioia et al. (2013), we used insights from the literature to guide the formation of theoretically rooted dimensions. In the analysis of the themes, we evaluated different theoretical frameworks but found that the data were closely aligned with the theoretical framework of the relational view (Dyer & Singh, 1998), which then provided the structure for how the themes converged into dimensions. Consequently, we identified the following aggregate dimensions: complementary digitalization capabilities, relation-specific digital assets, digitally enabled knowledge-sharing routines, and partnership governance. Thus, the aggregate dimensions represent a theoretically and empirically grounded categorization. Fig. 1 shows the entire data structure resulting from the data analysis.

As a fourth and final step, we assessed the progression across the studied relationships as we sought to uncover how digital servitization relationships unfold and how companies transform them. During this formative step, each researcher independently categorized the first-order categories and its associated data for each case with the relationship's progress category (foundational phase, intermediate phase, advanced phase). The researchers then came together to compare the results of categorizing the data that contributed to building each phase. Generally speaking, there was considerable agreement between authors on the independently categorized data. In cases of disagreement, we discussed the data and the reasoning behind the choice of phase category, which led to an agreement on establishing the connection between first-order categories and different phases of the relationships.

Table 2 provides a summarized overview (i.e. cross-case analysis) of the progression of provider-customer relationship within each case. Although the identified patterns were largely shared across the studied relationships, some were more evident within specific cases, and some took different form or focus among cases. The specifics of each case can be apprehended through a horizontal view of Table 2, whilst a vertical view of the table can enable a comparison of the cases across the aggregate dimensions. This is supported by empirical evidence showing representative quotations from each case for each of the first-order categories (see Appendix 2). This practice of comparing cases allowed us to further refine our data structure and generate an overall framework (Nag, Corley, & Gioia, 2007), explaining how the relationships unfold by linking various phenomena that emerged from the data analysis. Hence, a theoretically and empirically grounded framework was developed (see Fig. 2) through theorizing the logic and linkages across aggregate dimensions, second-order themes, and first-order categories.

4. Findings

Several insights emerged from studying the evolution of digital servitization relationships between provider and customer. Table 2 provides a simplified overview of the analysis, which shows that four aggregate dimensions make up the core relational components

associated with digital servitization relationships, namely *complementary digitalization capabilities, relation-specific digital assets, digitally enabled knowledge-sharing routines, and partnership governance*. The patterns emerged from data analysis are captured and validated by both sides of the relationship, which means that informants from both providers and customers have recognized them as influential in the relational transformation process in digital servitization. The following sections (4.1–4.4) provide explanations of each of the four relational components. Thereafter, chapter 5 brings the findings together into a relational transformation framework that draws links between the relational components and illustrates the progression of relationships across three phases (foundational, intermediate, and advanced).

4.1. Complementary digitalization capabilities

A common theme that surfaced among the study's informants is the importance attached to the partner's possession of complementary digitalization capabilities as the trigger for transforming the relationship. In other words, a company would typically enter into a revised business relationship if the potential partner possesses the digitalization capabilities that the company lacks (e.g. provider data analytics, customer operational knowledge). From case R1, a procurement manager from Beta explained how their reasoning went with regard to initiating digital service relationships:

> If you don't have the competence…, then you must perform it together with someone else that does have the competence…, so that they will be able to help you, then it would be beneficial to have a contract.

It was also highlighted that the most important reason that Beta partnered with their provider, Alpha, is that they have excellent capabilities for performing the tasks ensuring that Beta maintains high availability of electrical parts. Therefore, the data suggest that, if digital servitization partnerships are to be initiated, partners should *assess the potential for combining partners' capabilities*. This assessment allows partners to evaluate the additional value that can be created and captured through the new relationship. However, the assessment of partner's capabilities does not stop once the collaboration agreement has been signed; rather, in the case of digital servitization, it continues throughout the relationship from two relational perspectives.

The first perspective is to *evaluate the benefits of combining provider's expertise and customer's business knowledge* to optimize customer resource utilization. As the customer has deeper knowledge of its business and processes, the special need arises to complement this knowledge with the provider's expertise that can help improve efficiency through digital services. For example, an account manager from the provider Alpha spoke about how their skills could complement their customer's:

> As a customer you can have good people and knowledge about the business, but you need expertise and the possibility of escalating very tricky questions in an organization, so there is a lot of added value from Alpha. … It's really impossible for a customer… to be expert on everything.

Also, in case R4, the head of strategy and business development at Zeta stated that in their relationship with Eta, they strived to ensure that *"both the buyer and the supplier focus on what they are best at"*. This is supported by the example provided from another case relationship (R3) where an informant from the forestry company, Epsilon, showed that, although they had knowledge on the cost efficiency of logging, they needed to complement this data with the technical expertise of their provider (i.e. Delta) on using smart machinery in the most efficient way. Obviously, the provider too has to see that the relationship has value and that the potential is there to provide digital services and increase revenue generation since this will determine the scope and extent of investments.

In addition, we found that it is critical to continue to *monitor the partner's capability evolution and reassess complementarity*. Because of the high speed of digital-technology development and industrial adaptation, it has become vital that partners' capabilities continue to develop over time in order to maintain the rationale for continuing the relationship. If partners cannot keep up with the speed of development, a once profitable relationship can soon turn into an unprofitable and outdated collaboration. It is thus important for companies to monitor and evaluate complementarity dynamics (i.e. changes in complementarity) in the relationships in order to make sure that partners can deliver superior value creation than the alternatives. For example, in case R2, an informant from the provider Alpha described how the ongoing development of their knowledge and cooperation capabilities were very important to continue providing digital services to their customer Gamma, and reasoned:

> We are extending our knowledge outside our own products… the cooperation was more important for them than the technology, because they said the technology will evolve over time.

4.2. Relation-specific digital assets

When complementary digitalization capabilities are present, we find that provider and customer are inclined to realize the full potential of their partnership through investing in relation-specific digital assets. Two main second-order themes were highlighted by the study's informants on this subject. The first is that partners *invest in aligning digital technologies*, and the second is that they *invest in developing digital competence*. Our findings show that both areas evolve, following a similar trajectory over the phases of the relationship. The progression of each area is described below in line with our findings.

4.2.1. Invest in aligning digital technologies

In terms of digital technologies in the foundational phase of the relationship, partners are likely to jointly *invest in building digital systems* for customer operations. For example, companies often described initial efforts to install sensors or to connect a fleet of machines as key enablers of the digital transformation. The purpose is to ensure that the foundation for collecting and sharing data from digital services is provided. For example, in case R2 a product manager at Alpha stated that they built their applications on Gamma's digital systems by providing much of the initial technological hardware for free or at subsidy cost, knowing that in the near future they could capitalize on these investments. He highlighted that it was a "*co-development*" and joint efforts:

> We are building our applications on their platforms… and there will be applications that will be co-developed between us… that is a co-development and that should be free of charge for them, since they are putting in the same amount of time and efforts to do that.

But as the relationship develops and digital services evolve, it may not be enough to just build applications or digital functions on partner systems. Here, the need for digital platform thinking arises, and partners must start to *develop digital platform tailored to customer's systems*. The purpose is to facilitate and coordinate the implementation of multiple digital services across functions. For example, such platform can provide multiple benefits for different functions such as operations checking equipment performance, maintenance needs, and order optimization services. Similarly, key account managers from the provider can assess how they can better help customers by identifying equipment in need of replacement or earmarking areas where advanced services can help. Informants from customer companies shared the view that they tend to avoid adding new platforms from every single provider. They explained that their companies favor a tailored digital platform that connects smoothly to their systems. For instance, in case R1 the provider Alpha tailored a digital platform especially for their customer Beta, as described by an account manager from Alpha:

> We have a project called MyAlpha for MyBeta which will be more of a portal for everything, … it is the portal to maintain the connection between Alpha and Beta, so that's our goal, and we share production data in some way, and we will be making maintenance and things that you can purchase through that portal, so it's very extensive… So, it has MyBeta Production, MyBeta Maintenance, and MyBeta Purchase, etc. … If we can't tailor [it] then I don't see the value we add in comparison to other existing actors.

When the relationship becomes even more advanced, the digital platform can become an enabler of further continuous improvement and value creation. Partners work together to *enable offer customization and efficiency based on digital platform*. The goal of the partners is to use the digital platform to continuously identify new solutions, which can increase value creation. For example, in case R2 the provider Alpha used the digital platform for identifying operational problems in order to develop solutions, such as identifying positions of water leakages. An IT project leader from the customer company, Gamma, explained how the digital platform they had was a means to improve the digital service offered to them by Alpha:

> It was a new way of working that is based on cooperation between us and them. It was not that we just have a new system, but we have a platform where there are a lot of solutions that we can jointly work on. So, we share the knowledge and the solutions that come out and thus we progressively become better.

4.2.2. Invest in developing digital competence

Investing in digital technologies alone is evidently not enough for the digital servitization partnership to succeed. Informants from both provider and customer companies emphasized that partners need to invest in human assets and develop digital competence. A helpful practice at the foundational phase of the relationship is to *assign dedicated staff for managing digital systems*. Having dedicated employees can ensure that the agreed digital services are provided smoothly. This is especially important at the start of the relationship, because it can take some time for partners to adjust to new ways of doing things. In contrast, informants described many instances when a digital system was installed and nobody was given responsibility for managing it; no value was created because of lack of use. Thus, committing human resources to the digitalization effort is key. From the customer side of case R1, a procurement manager at Beta stated that they assigned a dedicated employee who *"just keeps track of all the different parts that are involved"* in the digital project with their partner. From the provider side, informants from Alpha explained that they assigned staff dedicated to managing the digital systems from both business and technical angles:

> "For the last three years, I have been a strategic account manager for Beta and… we have a contract manager who can be on site, so it's more or less full time looking after the customer that Alpha has to deliver to". "We have engineers with such close attachment to their process and their systems."

In order to take the relationship to the next level, partners work to further boost their digital competence. To do so, informants pointed out that partners actively *allocate time and resources to gain know-how of business processes*. In case R2, this took the form of a cooperative digitalization center where both partners invested time and resources, and cooperated in expanding their know-how of business processes, as clarified by informants from Alpha:

> "The [cooperative digitalization center] is a way to get to know how their process works". "You need a customer that is happy to change and is willing to invest the time, because they have to invest a lot of time to map their current data infrastructure."

When the maturity level of the relationship grows and more business opportunities arise, partners are likely to *build joint digital and analytics team to keep track of key operational processes*, as suggested by this study's informants. Many informants shared the view that having a joint digital team is helpful in the development of digital competence. This joint team includes members from both parties who have an understanding of digitalization and operational processes. A good example was highlighted in case R2. A product manager from the provider, Alpha, said that the joint digital and analytics team with their customer, Gamma, deployed many digitalization experts to clean and verify data in the expectation of drawing some valuable insights from the data. Also, an IT project leader from Gamma explained how this joint team contributes to developing digital competence through regular meetings where new solutions are regularly developed and tested:

> "We have ongoing development projects… Here, we have meetings every week and it is all about fast cycles of development, then testing, again development, then testing."

4.3. Digitally enabled knowledge-sharing routines

Besides investing in relation-specific assets, partners have to set up knowledge-sharing processes and routines, which are essential for digital servitization. In this type of relationships, knowledge-sharing routines are unsurprisingly digitally enabled and data driven. Our findings confirm that routines do not necessarily take the form of conventional meetings where people sit down and share knowledge, but they can also be enabled through digital means. Data is typically generated, collected, analyzed, and transformed into knowledge through smart hardware and analytical software. Two key second-order themes emerged from analysis of informant data regarding sharing and utilizing knowledge. The first is that partners need to *enhance transparency in knowledge-sharing*. The second is that they should make use of this knowledge, so that they cooperatively *develop processes for utilizing data and knowledge*. Both transparency and utilization of knowledge develop over time; below, we draw on our findings to explain how they evolve and progress.

4.3.1. Enhance transparency in knowledge-sharing

Informants stated that a core feature of digitalization as an enabler of servitization is the ability to *collect operational data from physical assets to monitor performance*. With this purpose in mind, Alpha informants explained that as a provider, their company ensures that data is generated from all equipment and stored in a database:

> "Every single piece of equipment sends information up". "We have a constant flow of data out of system that we build into some kind of database". "You can track all activities related to a machine."

Therefore, the necessary technologies, such as sensors and vibrators, should be set up and dedicated systems installed for storing data from the start of the relationship in order to track the activity of machinery. In case R3, the chief technical officer of the forestry company, Epsilon, gave the example of installing software and hardware to monitor the performance and calibration of machinery:

> "In every machine, [there is] a software and hardware vibration sensor… to take the data from the machine… Delta have a lot of sensors in the machines so that they are actually able to say that this machine is underperforming because we can see that crane is moving 10% slower than other cranes, or the cutting is made slower compared to other machines… The system is basically monitoring the calibration of the machines."

As the partnership develops, partners take a step further concerning transparent knowledge-sharing. Our informants suggested that they collaborate to *accumulate and connect data from multiple sources to enable transparency and optimization.* As informants explained, it is often the connecting of different sources of data that enables companies to identify hidden operational problems and to use artificial intelligence

and analytics to optimize equipment operations. Data is accumulated from the whole fleet of machines and from the entire process; this can include multiple and diverse machines and systems that can facilitate better coordination and site management. Informants from Alpha, for example, stated that partners seek to connect relevant data together with the aim of optimizing, and not just monitoring, machine operations:

> "We collect a lot of data from control systems… It's only when you start combining data you have not combined before that you are getting more value." "We definitely look into how we can make use of the data that we already have, and also make it interact with other types of data that we can get hold of and merge it into one sort of environment, so we can provide better solutions for condition-based maintenance… and also then optimization during actual operations."

The head of procurement development at Beta agreed and emphasized that this leads to better transparency in knowledge sharing:

> We need to have an open interface… and then everyone can benchmark everything and [know] that machine performs this and that, and then some weak machines perform this, and that is fantastic transparency.

However, when the digital servitization relationship advances, partners need to do more than just accumulate and connect data. A common theme discussed by informants is the need for partners to *align incentives to enable increased data transparency and analysis*. A business operations manager at Zeta explained that when partners align their expectations and have incentives that are not in conflict, they can maintain transparency and trust in the relationship, and this enables them to be more open in sharing data:

> If you want to act in a co-operative way, you need to be able to have a good relationship… and build your relationship based on transparency and trust to share critical assumptions that each party is making.

It is important that both parties have incentives to share knowledge and that they appreciate that business opportunities can accrue from this exchange to the benefit of both, as described by a technology development engineer from Beta:

> The technology starts to exchange information between the supplier [and customer]… and so after a while the business opportunity will emerge… a supplier can of course make use of that data for their own fleet optimization or fleet analysis.

4.3.2. Develop processes for utilizing data and knowledge

Needless to say, data and knowledge have little value if not utilized and acted upon. Therefore, partners need to collaborate in order to maximize value from the data collected and the knowledge exchanged. At the foundational phase of the relationship, utilization of generated data is usually not that well-structured because partners are still exploring and testing processes. So, at the start of the collaboration, partners tend to *undertake* ad-hoc *discussions to utilize insights from operational data*, as informants suggested. An informant from Beta stated that this can simply take the form of discussion and feedback among operators. Another example was provided by a service business planning manager at Delta, who described how data on productivity was discussed in an ad-hoc way and utilized to improve efficiency:

> They saw that [an operator] had a lower fuel consumption per cubic meter and higher productivity that he could see on the site… then [operators] started to discuss, and now they are more or less on the same level, and it is a lot of money for them.

Nevertheless, when the relationship develops, the processes of data utilization develop as well. Informants stated that partners try to find better ways to utilize knowledge, so it becomes more highly structured with the aim to *set up regular interactions between partners to integrate data into joint operations*. These interactions take place at different levels. In case R1, an account manager at Alpha explained that they *"interact with customers on a daily basis on all levels, both project [level] and operations [level]"*. A procurement manager at Beta further explained how they set up different levels of interaction with Alpha, including daily operational meetings, monthly and quarterly managerial meetings, and semi-annual senior management meetings:

> "Daily contact is kept on a certain level, which might be the operators talking to the sales every morning briefly for 15 minutes. Then, you have monthly or quarterly meetings… and you have [semi-annual] meetings [where] you want to bring the top-level management so that they are involved." "The quarterly meetings [can be] with procurement interpreting the agreement structure if needed, but the everyday meetings can be very informal and just the relevant information is transferred back and forth."

Although these structured interactions can be very valuable in terms of utilizing knowledge and integrating data into joint operations, informants stressed that partners go beyond that when the relationship advances. Partners in an advanced relationship are likely to *establish a multi-level joint team to use data for continuous improvements and innovation*. In other words, this may be seen as a joint Research and Development (R&D) team supported by teams from top senior management to oversee the partnership and its operations. In case R4, for example, Zeta's head of strategy and business development explained that they had a large joint team in charge of leveraging digitalization to drive continuous improvement:

> I would say 10 to 15 people from our side across the business and marketing area, and maybe 10 to 15 people from networks, commercial and marketing from Eta's side… who were working on refining together.

These joint teams tend to generate many new ideas for improving operations or innovating new solutions. Thus, a key purpose of the joint team is *"prioritizing between the projects that appear"*, as explained by an IT project leader at Gamma, concerning their so-called 'core team' that was established jointly with their partner, Alpha (case R2). Informants from Alpha further outlined their collaborative model for fostering continuous innovation in their digital services through joint teams with their customer:

> You have so many cases, and you have so many ideas. We can't do everything at once, and maybe we even shouldn't do some of the things. So then, we have a collaboration model where we have a [joint] business team that identifies the scope and makes the business evaluation of a solution, and then we have a solutions team that makes this happen, and there is an evaluation process between those.

4.4. Partnership governance

In order for the collaboration to succeed, partners should agree on mechanisms to govern their partnerships. A shared theme stressed by informants is that the further the relationship develops, the more partners evaluate and *develop governance approaches* in tandem. This is held to be critical because effective and efficient governance is needed if both partners are to fully benefit from relation-specific digital assets and digitally enabled knowledge-sharing routines. Thus, the balance between control and flexibility gets adjusted by partners over time to improve governance efficiency. However, balancing the two can be a

complex task in a setting where creativity and innovation are anticipated, as suggested by the head of procurement development at Beta:

> [It is] a tricky balance trying to set up some of the broad rules for collaboration but at the same time not killing creativity.

More weight tends to be given to informal governance mechanisms as the digital servitization relationship evolves. This is natural given that mutual trust grows over time, leading to more efficient and effective governance approaches. Additionally, relational trust makes negotiations between partners easier, allowing greater flexibility to discuss the complex technical details of digital services. Our findings show that digital servitization partnerships often begin with a highly *contractual governance* approach, then develop into the phase of *transitional governance,* and eventually on to a highly *relational governance* approach as the relationship matures.

At the start of the relationship, partners by and large *initiate contractual governance to safeguard partners' interests*. This is generally approached with a high level of control, as a procurement manager from Beta asserted: *"trust is good but control is better"*. The initial digital service contract is likely to be very detailed given that trust has not yet been built, so partners want to safeguard themselves from certain scenarios. Significant efforts can be undertaken to understand key performance indicators and what drives value creation. Zeta's business models researcher described how a contract for digital services can be laid out in meticulous detail at the beginning of a partnership:

> "There are tight boundary conditions needed, this is back to the contract again… it's extremely important in these types of contract that you have… simulated some scenarios that you can have, with tight boundary conditions." However, "[there is] the example of something we didn't really capture in the contract but we should have."

So, it is not possible to anticipate and account for every possible scenario that may happen throughout the relationship, as unexpected events can take place. It can also be a slippery slope when partners try to add contractual details to deal with unexpected scenarios. Therefore, partners may consider adding contractual incentives to enable a transition to a partnership of trust.

Correspondingly, partners are likely to *establish transitional governance to revise the contract and realign incentives* to move the relationship forward. Since the study informants saw this as a transition phase in the governance of the partnership, we refer to it as *transitional governance*. An example of contractual incentives that was put in place to enable the transition was from case R4, where Zeta and Eta incorporated a 'reward-penalty' mechanism in their contract in order to align incentives. This was in parallel to a more traditional contract revision and re-negotiation. Zeta's business model researcher remarked that validated performance from data-driven KPIs usually form the basis for re-negotiating the contract. Thus, the consequent revision can be focused on concrete value creation opportunities, informed by the lessons learned:

> We had a few revisions of the contracts and re-negotiations… I think both parties learn… there were quite a few KPIs and they were always up for negotiations and fine tuning… What we had were [data-driven] KPIs… [which] told us if the quality of what we delivered was better than certain levels.

The head of procurement development at Beta (case R1) agreed with this approach and explained that the contractual framework should realign the goals and incentives among partners:

> Like the old analogy, you don't pull the rope from different sides, but rather pull the rope from the same side… you are together trying to solve the problem. It's not you versus the supplier… if you are somehow able to construct a framework, so that you set up KPIs and outcomes in an intelligent way that both you and the other party get exactly the same impetus to solve the problem, then it would be nirvana.

Beta's informants amplified that contract revision with Alpha emerged into experiments with different contractual models based on 'gain/pain sharing' logic. Basically, the aim of transitional governance is to drive incentive alignment and to set the scene for the transition from a highly contractual approach to a highly relational governance approach. When the relationship is advancing fairly well and they are feeling increasingly confident about each other's competence and capabilities, partners are inclined to take governance mechanisms to the next level.

Informants suggested that, as the relationship evolves, partners *set up relational governance based on trust to focus on mutually beneficial improvements*. Many informants referred to this as the dream state where the central focus would be placed on finding value improvements rather than on governing the partner's behavior. *"It's relations, relations, relations",* as an account manager from Alpha put it. Procurement managers from Beta explained that when the partnership matures and digital services become more complex, governance is increasingly based on trust with no tight controls or rigid monitoring of transactions:

> Don't even try. You will not be able to control it, and that's not the way it works. Replace it with trust… You are in the same boat; you have to trust each other and cooperate.

Trust also enables more efficient negotiations processes. In case R2, an informant from Gamma enthused that negotiations had turned into an open and transparent dialogue between partners. She further explained how they agreed on joint governance based on regular contact and a collective review of the performance of digital services:

> The steering group, an extended core team, is to decide which projects we will continue with, how the business deal in each specific project should look like, so that we focus on the right things in relation to our strategies. Here, we meet six times a year with decision makers from both Gamma and Alpha.

5. A relational transformation framework for digital servitization

Based on the analysis, this research article proposes a framework to explain how providers and customers transform their relationship as they embark on digital servitization. The framework is grounded in empirically rooted themes and theoretically motivated aggregate dimensions that emerged during the data analysis. We constructed and evaluated different ways in which second-order themes related to each other. The evaluation of various frameworks revealed that relational transformations in digital servitization were best illustrated by a framework depicting key phases, where one phase builds on the other. This is presented in Fig. 2, which illustrates the linkages among the relational components across three phases (foundational, intermediate, and advanced) to create a relational transformation framework for digital servitization.

The framework proposes *complementary digitalization capabilities* as the main trigger for initiating a digital servitization relationship and preserving it over time. Thus, complementarity is the foundation for creating the possibility of a close and mutually beneficial relationship, i.e. a precondition for it to make sense to explore a deeper relationship. As the digital servitization relationship between the two partners evolves, their investment and engagement in the relationship grows accordingly. To progress to a more advanced phase of the digital servitization relationship, partners must continue to invest in *relation-specific digital assets* and enhance *digitally enabled knowledge-sharing routines* in order to maximize the value-generation potential of the

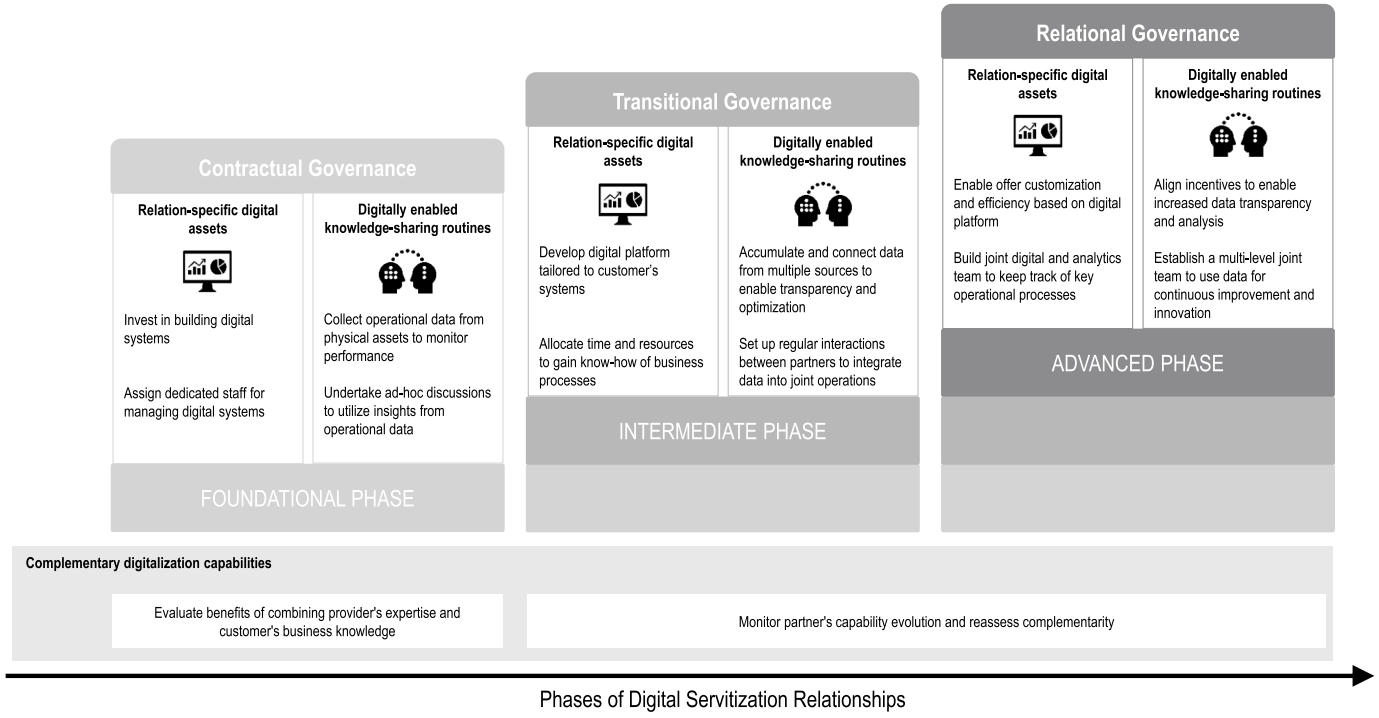

Fig. 2. A relational transformation framework for digital servitization.

relationship. Furthermore, the data analysis suggests that the approaches to *partnership governance* need to be transformed to become more trust-based and more efficient to fully leverage the potential of the advanced phase of digital servitization. The following sections elaborate on how these relational components evolve across the foundational, intermediate, and advanced phases of relationships in digital servitization, and how these phases build on each other.

5.1. Foundational phase of relationships in digital servitization

The findings show that the foundational phase of a digital servitization relationship is of an exploratory nature. This is entirely natural given that each partner sees the other as a 'new partner'. They both work together to lay the foundations of their partnership, build trust, and learn about each other's business processes. At this phase, the investments in *relation-specific digital assets* are very much focused on building the digital systems needed to provide the agreed digital services. To facilitate the provision of these new services, partners assign dedicated staff to manage these digital systems. In terms of *digitally enabled knowledge-sharing routines*, their main purpose at the start of the relationship is to collect data to monitor performance in support of the digital service. When insights arise from the operational data, partners act on them in an ad-hoc and rather unstructured way. An automation manager from Beta described how the foundational phase of the relationship had evolved:

> At an early stage, I think you are just trying to understand what data do we have, what data could we have and what could we do with that data. I think you need to get this foundation before you start investing too much without a sense of direction.

In light of this, the nature of the foundational phase of the relationship requires that a *contractual governance* approach is adopted, which allows each partner to control and monitor the performance of the other partner and assess the potential for continuing the relationship. Thus, formal contractual mechanisms are needed to safeguard the partnership and build trust. Through these mechanisms, each partner can ensure that their expectations are documented, understood, and met by the other. The focus of contractual mechanisms, though, varied between cases. For example, the emphasis in case R2 was on defining the details of the collaboration model, whereas the focus in case R4 was on defining back-stops in the contract. Nonetheless, informants from all cases shared the view that the foundational phase is important in that it sets the tone for the partnership and determines its chances of moving forward.

5.2. Intermediate phase of relationships in digital servitization

When each partner gets to better know each other, they explore the potential to develop their partnership further. Therefore, they enter the intermediate phase of the relationship, which is characterized by partners working together to increase the value of their partnership. So, with regard to *relation-specific digital assets*, the investment of the partners is focused on developing a digital platform tailored to customer systems. Additionally, partners allocate more time and resources to improving their staff's know-how of business processes, which can lead to the opening up of business opportunities. However, this endeavor cannot be achieved without proper *digitally enabled knowledge-sharing routines*. They should move from merely monitoring performance to optimizing operations through accumulating and connecting data from multiple sources. Moreover, regular interactions between partners should be put in place in order to integrate data from joint operations and utilize knowledge effectively. A global product manager at Alpha described the criticality of this phase in the transformation where the foundations from earlier phase could be expanded upon:

> When you have everything connected and can start to visualize what is happening, this is when it starts to be exciting and the value can emerge. We worked closely with Gamma to find how we can adapt

the system to solve their needs… and prioritize next steps in development.

On these grounds, a *transitional governance* approach is required to govern the transition in the relationship. As trust between partners has developed by this phase, partners revise and re-negotiate their contracts based on the lessons learned previously. Just like the foundational phase, the focus in intermediate phase varied between cases. For example, case R3 focused on revising the prices according to a new service contract, whilst case R4 sought reward-penalty logic to align incentives. Nevertheless, the goal is to establish better governance mechanisms and better align incentives between partners to move from a highly contractual arrangement to a highly relational governance approach, which is found to be more effective in a digital servitization context.

5.3. Advanced phase of relationships in digital servitization

The relationship can be considered advanced when partners have reached a position of strong mutual trust, and when each partner can see the other's loyalty and commitment to the partnership. The advanced phase of the relationship takes on a more strategic nature, as it is based on longer-term goals that drive substantial investment in continuous improvement and innovation. At this phase, investment in *relation-specific digital assets* can be based on the digital platform that was built at an earlier phase. Here, customers tend to allow their providers greater freedom of design, enabling offer customization and improved efficiency. It is also very likely that partners invest in building a joint digital and analytics team that conjointly keeps track of key operational processes. In terms of *digitally enabled knowledge-sharing routines*, both transparency and knowledge utilization tend to significantly advance at this phase, since incentives are aligned to permit the comprehensive exchange and analysis of data. Again, this is facilitated by the digital platforms that the partners have already built. A joint R&D team is also likely to be established to foster continuous improvement and innovation with effective utilization of data and knowledge. In other words, digitally enabled knowledge-sharing routines shifts from coordination to integration. A key account manager at Zeta explained how they worked together in this phase:

> We sit together with Eta and have everything connected to be able to monitor and optimize the whole network… daily meetings allow faster decision making, and we are always adapting to emerging needs of the network.

To that end, partners need to adopt a *relational governance* approach to facilitate continuous improvement and innovation, as tight controls can hinder innovation in digital servitization. Similar to other phases, the focus of activities varied between cases. For instance, case R1 emphasized a joint development strategy, whereas case R2 focused on establishing a joint budget aimed to direct investment efforts. However, partnership governance at the advanced relationship phase becomes mostly embedded in informal governance mechanisms. Partners trust that each will do their best to maintain the relationship and will do nothing to jeopardize their partnership, as both benefit greatly from it. Partners are also keen to maintain their reputation as a good strategic partner that other companies will want to collaborate with in the future. This provides an additional safeguard in relational governance.

6. Discussion

The transformation to digital servitization is increasing in complexity with progressively higher relational requirements for customization and operational efficiency (Cenamor et al., 2017; Eloranta & Turunen, 2015). This is enabled by novel technologies that are being developed at high speed. Failing to adapt to these new relational requirements constrains the ability of providers and customers to profit from digitalization; existing research provides little guidance on this matter. This study advances knowledge on the transformation of B2B provider-customer relationships in digital servitization by combining insights from the servitization literature (e.g. Baines et al., 2017; Cenamor et al., 2017) and the relational view (Dyer, Singh, & Hesterly, 2018; Dyer & Singh, 1998) with an in-depth qualitative study of leading companies engaged in digital servitization.

Based on qualitative data from four provider–customer relationships, the findings reveal how companies undergo a transformation in revising their relationships in order to pursue digital servitization. Furthermore, drawing on the relational view, this study identifies four relational components that are important in digital servitization; *complementary digitalization capabilities, relation-specific digital assets, digitally enabled knowledge-sharing routines, and partnership governance*. The *relational transformation framework for digital servitization* shows how the relational components are developed and provides guidance on how companies can facilitate both customization and operational efficiency by leveraging the value of digital technologies. Thus, the present paper carries theoretical implications for the servitization and digitalization literature, and offers managerial implications for senior managers responsible for digital servitization initiatives.

6.1. Theoretical implications

This study contributes to the growing body of literature on servitization, and more specifically, digital servitization (e.g. Bustinza, Vendrell-Herrero, Parry, & Myrthianos, 2015; Holmström & Partanen, 2014; Kohtamäki et al., 2019; Vendrell-Herrero & Wilson James, 2017), by adopting a relational view to examine how providers and customers transform their relationships in digital servitization. The core contribution is the development of *a relational transformation framework for digital servitization*. The proposed framework contributes in three specific ways.

First, this study contributes by *demonstrating relational engagements and a relational view as key to progressing in digital servitization*, since the present study shows that the provider–customer relationship needs to be transformed in order to maximize the benefits from digital servitization (Pagoropoulos et al., 2017). For example, companies that are unable to change their relationship would typically get stuck in transactional negotiations, unable to meet the required speed of innovation in digital servitization. The rapid change associated with digital technologies requires continuous innovation that is best facilitated by taking a relational view. Moreover, servitization studies have been criticized for being largely phenomena driven and lacking theoretical application (Rabetino et al., 2018). We attempt to address this shortcoming by applying a well-established theoretical perspective (the relational view) in the context of servitization in general, and digital servitization in specific.

Second, this study contributes by *illustrating how transformation unfolds in digital servitization and by showing the interdependence of activities along the transformation process*. Both the servitization and the digitalization literature recognize that digital servitization is a process, but an in-depth relational view of how the transformation unfolds has been lacking (Bharadwaj et al., 2013; Lerch & Gotsch, 2015). Whilst there are previous studies that have offered transformation models for providers moving to digital servitization (e.g. Iansiti & Lakhani, 2014; Lerch & Gotsch, 2014), they have largely focused on the provider's transformation rather than the provider–customer relationship as a whole. We argue that the framework we propose is novel in terms of providing a holistic transformation model for the relationship at its various relational phases. Each phase builds on the proceeding one as companies make joint investments and build stronger relationships over time. Thus, the findings provide direction on which order to perform certain

activities to handle relational complexities. The framework takes into account both provider and customer perspectives, and it considers them as partners who jointly co-create value through interdependent activities. For example, the framework shows that, at an advanced phase of the relationship, partners invest in building a joint digital and analytics team as part of the relation-specific digital assets, in conjunction with setting up a joint team that uses the data for continuous innovation as part of the knowledge-sharing routines. Both teams are interdependent as they keep each other informed. Therefore, partners should consider balancing investments and attention across all the relational components.

Third, this study illustrates the *central role of different approaches of governance for various phases of digital servitization relationships*. We argue that a governance approach needs to be progressively nurtured and adapted over time. Although literature on servitization and digitalization highlights the need for relational and trust-based governance approaches e.g. Reim et al., 2018; Sarker et al., 2012; (Sjödin, Parida, & Kohtamäki, 2019), they mostly focus on comparing relational governance and contractual governance, or on formal and informal governance mechanisms. The framework presented in this paper provides novel insights into the middle way of making the transformation from contractual governance to relational governance, i.e. *transitional governance*, which we argue is essential to transform the digital servitization relationship. Progress in governance helps to lay a foundation to enable the development of other activities that also progress over time. By way of illustration, contractual governance is focused on understanding the partner at the foundational phase, and transitional governance is focused on realigning goals and incentives at the intermediate phase, whilst relational governance is very much focused on continuous innovation at the advanced phase of the relationship.

6.2. Managerial implications

In addition to its theoretical contributions, the present study has several managerial implications for managers who are active in servitization efforts in manufacturing companies, in addition to managers in companies pursuing the procurement of digital services.

First, the framework can serve as a guide for providers and customers wanting to develop their business relationships in the specific context of digital servitization. Indeed, digitalization is speeding up the business climate, and exerting pressure – by placing new requirements – on provider–customer relationships (Pagoropoulos et al., 2017). For example, manufacturing companies need to acquire new digital capabilities, such as big data analytics, systems integrations, site operations optimization that traditionally product providers do not offer (Lenka et al., 2017). Thus, it becomes vital to find ways to make optimum use of the company's and its partner's capabilities in order to maximize value for both parties. Our framework provides sound guidance for companies interested in transforming their relationships to better benefit from digital servitization. Based on insights from providers and customers going through this transformation, the framework highlights what to focus on at different phases of the relationship, and it helps managers prioritize resources. This hopefully leads to more informed discussion and decision making.

Second, the specific activities identified for the different relational phases of the framework can serve as a template to facilitate discussions and negotiations between providers and customers on how to move forward with digital servitization. Managers from both sides can build their discussions on, for example, what level of investment in relation-specific assets is needed from each partner to profit from digital servitization – for instance, investment in aligning digital technologies and developing digital competences, and the relevant sub-activities. Key to such discussions and negotiations is how relation-specific digital assets need to co-evolve with digitally-enabled knowledge sharing routines. For example, partners should discuss how the digital platform (relation-specific asset) can help to accumulate and connect data from multiple sources (digitally enabled knowledge-sharing routines). Thus, focusing on one to the neglect of the other will not generate the intended value.

Third, by highlighting the central role of governance, the framework supports managers in developing the mechanisms needed to govern the relationship in its different maturity phases. The framework shows that development in governance approaches is a process, which can take time to progress. Managers from both sides should continuously revise their governance approach in order to make it more efficient, based on the lessons learned. It is worth mentioning that there are cases where companies progress from highly contractual to highly relational governance at a fast pace. This may be due to other factors, such as existing cooperation between the companies, personal relationships between managers of both parties, and the market reputation of the companies. Managers should take all of these factors into account when discussing governance mechanisms.

6.3. Limitations and further research

The present study relies on in-depth case studies of four digital servitization relationships operating in diverse mature industrial settings. Therefore, the findings should be considered specific to the digital servitization setting, and applicable primarily to contexts characterized by similar conditions. For example, a digital service for consumers (B2C) would probably use a different process since scale, complexity, and risk are likely to be different, and the benefits of a relational view are less. Although the empirical basis for our conclusions is rather broad, we appreciate that future work on digital servitization could differ from our findings, contingent on cultural differences, distance, and relationship types, for instance.

Furthermore, although the findings suggest that an advanced phase of digital servitization relationship and relational governance create higher value potential than a standard contractual arrangement, further quantitative study can strengthen and validate this proposition. One can argue that it is not always the best option for all relationships to aim for the highest level of relational engagement. Similar to discussions on different degrees of product–service integration, Base-, Intermediate-, and Advanced services (Baines & Lightfoot, 2013), opting for the highest level of advanced services is not always the best option for all companies (Kowalkowski, Gebauer, Kamp, & Parry, 2017). Rather, companies should consider the level that is most suitable based on their operational needs, required capabilities, industry trends, and value-generation opportunities, for example. Hence, we suggest further research on the contingency perspective concerning relational transformation in digital servitization. In particular, quantitative studies using a time lag to measure the transformation and dependent variables related to performance could provide insights for partners in determining the level they are most motivated to explore. A study based on a well-designed survey can enable theory building and can assist in the generalization of findings.

Finally, we acknowledge that digital servitization may occur in other types of relationship in addition to dyadic relationships. Network or ecosystem perspectives with multiple partners may also be a fruitful line of investigation (Kohtamäki et al., 2019; Sjödin et al., 2018). Exploring the emergence of digital servitization through co-creation among different network actors (e.g. providers, service delivery partners, and customers) could provide interesting multi-actor perspectives for future digital servitization research. Network or ecosystem perspectives seem to be particularly pertinent given the increasing speed and complexity of the digital transformation of industry.

Appendix 1. Examples of interview questions

- Can you describe how the digital servitization relationship started and evolved?
- Which activities are critical in facilitating digital servitization?
- Can you describe how you interacted with your partner (customer/provider) when co-developing and delivering digital services? Explain changes in processes and routines.
- Can you explain how the relationship has been governed?
- Can you describe how you align the interests with partner throughout the relationship?
- Explain how data have been used throughout the relationship.
- Can you describe the capabilities needed for digital servitization and how you have filled the capability gap?
- Can you describe the use and development of digital platforms in the relationship?
- Can you suggest additional names of staff who have been active in the relationship and are able to provide details on how it has evolved?

Appendix 2. Representative quotations for categories from each case

Aggregate dimensions, second-order themes, and first-order categories	Supporting quotation from case R1	Supporting quotation from case R2	Supporting quotation from case R3	Supporting quotation from case R4
Complementary digitalization capabilities				
1. Assess the potential for combining partners' capabilities				
A. Evaluate benefits of combining provider's expertise and customer's business knowledge	"I think it's like we combine different knowledge, the customer knows the process, [we] know about products, and if we look at other customers we can analyze and look at what can be done. Then we can find real benefits for the customer"	"They have some idea how they measure the hydraulic values in the grid, and we developed this together"	"It's actually Epsilon that has the knowledge about what's the most cost-efficient way of logging I would say. Delta knows a lot about the machine and how to be efficient in that way"	"[We wanted] to make sure that… both the buyer and the supplier focus on what they are best at… [we] are able to use Zeta's equipment in the most efficient way… [but] we were not the operator, they were, and as a result they understood the [business] very well than what we did"
B. Monitor partner's capability evolution and reassess complementarity	"Of course, we learn from every project and we learn from every customer as well. So, we build our knowledge base, no doubt about that"	"We are extending our knowledge outside our own products… the cooperation was more important for them than the technology, because they said the technology will evolve over time"	"We develop knowledge about real production data and we normalize it to know what is the real issue, is it the machine or the operator?"	"We have to follow-up everything… so that we are developing right things"
Relation-specific digital assets				
2. Invest in aligning digital technologies				
C. Invest in building digital systems	"Through cooperation you can get suppliers to develop products and systems and so on"	"We are building our applications on their platforms"	"We have collaboration on different levels from very long-term projects as with the project with our customers where we build systems"	"We still had to install the base station out there which is a physical component we had to put out"
D. Develop digital platform tailored to customer's systems	"We use only one system… and then we tell suppliers that you need to connect [the platform to it]"	"It's a platform, not a product from the shelf, it can be what we want it to be"	"One platform for handling [customer's] operations where… we could perform certain utilization or production volume or keep an uptime on the machines"	"[customer] provides inputs as to what are possible technological solutions that could be offered here and what could be the role of the platform"
E. Enable offer customization and efficiency based on digital platform	"You have to have [customized] solutions, which is costly"	"It was not that we just have a new system, but we have a platform where there are a lot of solutions that we can jointly work on. So, we share the knowledge and the solutions that come out and thus we progressively become better."	"The platform gives you clear direction on how you will be optimizing the… machines"	"In order for this to fly, we need full design freedom, we need to do the planning otherwise we will not have the competitive advantage"
3. Invest in developing digital competence				

F. Assign dedicated staff for managing digital systems	"We have engineers with such close attachment to their process and their systems"	"We have engineers basically [who] are doing collaborative operations with them"	"[There is] a machine instructor from Delta [who is available] to tune the machine"	"We put in a more structured key account manager and he really took on the challenge to… establish processes and intervals"
G. Allocate time and resources to gain know-how of business processes	"We work daily with Beta and we have a team here… connected to the site, … and we look into [their processes] … so this kind of settings are already in place and it works"	"The [cooperative digitalization center] is a way to get to know how their process works". "You need a customer that is happy to change and is willing to invest the time, because they have to invest a lot of time to map their current data infrastructure".	"We perhaps have more projects with Epsilon than the other companies mainly because Epsilon is putting resources in it"	"We had this gross list with gaps… from businesses and processes to IT to management and resources… then we prioritized"
H. Build joint digital and analytics team to keep track of key operational processes	"[The team has] a lot of data scientists involved in order to clean and verify that you have the right data and also see that it's persistent over time"	"We, [the joint team], have ongoing development projects… Here, we have meetings every week and it is all about fast cycles of development, then testing, again development, then testing"	"We were discussing how we can [control] operations together with the machine manufacturers"	"They are sitting in a joint- almost like a center. So they have like between 5 and 10 guys from each company working together prepped with developing the collaboration during that project"
Digitally enabled knowledge-sharing routines				
4. Enhance transparency in knowledge-sharing				
I. Collect operational data from physical assets to monitor performance	"For every device there is internet of things and it starts to generate data"	"Every single piece of equipment sends information up… We have a constant flow of data out of system that we build into some kind of database"	"We are responsible that our machine communication is up and running and we get the right [data] from the machines"	"Data is provided, captured, and sent into the connectivity"
J. Accumulate and connect data from multiple sources to enable transparency and optimization	"You have connectivity and you access information based on all the assets, like where they are and how they impact each other"	"We definitely look into how we can make use of the data that we already have, and also make it interact with other types of data that we can get hold of and merge it into one sort of environment, so we can provide better solutions for condition-based maintenance… and also then optimization during actual operations"	"We have a fleet management system for all brands [of machines] and it can take the information"	"If you get data from different setups, then you will get answers"
K. Align incentives to enable increased data transparency and analysis	"Very important is that all share the same information from board to floor … then you can really empower people and get involvement of all people … [so] operators have the right information and it gives a transparent [relationship]"	"We also understand that some other users may want to combine our data into something else to create another value, and we need to make sure that we are part of it"	"They could actually look at [the data] themselves, they could actually see what we should take next step to improve, so they can do the analysis themselves"	"If you want to act in a co-operative way, you need to be able to have a good relationship… and build your relationship based on transparency and trust to share critical assumptions that each party is making"
5. Develop processes for utilizing data and knowledge				
L. Undertake ad-hoc discussions to utilize insights from operational data	"They get feedback from operators"	"We try to find ways to discuss and cooperate, mainly regarding [improving] the process"	"They saw that [an operator] had a lower fuel consumption per cubic meter and higher productivity that he could see on the site… then [operators] started to discuss, and now they are more or less on the same level, and it is a lot of money for them"	"We did it in a very unstructured manner and that's the way we have been doing transactional business"
M. Set up regular interactions between partners to integrate data into joint operations	"Daily contact is kept on a certain level, which might be the operators talking to the sales every morning briefly for 15 min. Then, you have monthly or quarterly meetings… and you have [semi-annual] meetings [where] you want to bring the top-level management so that they are involved"	"We call for a management meeting twice a year, where we discuss common matters related to both companies"	"We have collaboration on different levels … there are mechanics and sales persons meeting with the operators and product managers from Epsilon … we have these meetings two to three times per year"	"We had a few people, I was among them, trying to keep [customer's] management updated on what we are doing"

N. Establish a multi-level joint team to use data for continuous improvement and innovation	"We need to combine and cooperate where we have the customer and the supplier and all the data and we analyze all the data and use it"	"We have a collaboration model where we have a [joint] business team that identifies the scope and makes the business evaluation of a solution, and then we have a solutions team that makes this happen, and there is an evaluation process between those"	"They [the joint team] are mainly focusing on innovation and industrial solutions"	"I would say 10 to 15 people from our side across the business and marketing area, and maybe 10 to 15 people from networks, commercial and marketing from Eta's side… who were working on refining together"
Partnership governance				
6. Develop governance approaches				
O. Initiate contractual governance to safeguard partners' interests	"With the formal contract in place, you know by large how the responsibilities and rights are divided between the parties"	"When we created the collaboration model in the contract, we focused on finding win-win situations so that both parties are willing to go forward [with the contract]"	"You need to set the goals and how to follow up… you need to know what is happening"	"There are tight boundary conditions needed, this is back to the contract again… it's extremely important in these types of contract that you have… simulated some scenarios that you can have, with tight boundary conditions"
P. Establish transitional governance to revise the contract and realign incentives	"Creating a framework that is balanced and actually aligns the targets"	"We also redefine the definition of 'done'. Like when are we done with this step and when do we take the next step?"	"we re-negotiated and reset the price"	"We had a few revisions of the contracts and re-negotiations… I think both parties learn… there were quite a few KPIs and they were always up for negotiations and fine tuning… What we had were [data-driven] KPIs… [which] told us if the quality of what we delivered was better than certain levels"
Q. Set up relational governance based on trust to focus on mutually beneficial improvements	"It's based on trust; I mean we go in with projects that we both believe in"	"We think about the long term… there really is openness and willingness to cooperate… we characterize this relationship as working in a new and different way"	"We [become] close to each other… our relationship and understanding for each other increase… [they] have confidence in me and it is really ideal in the business"	"It was very much an entrepreneurial spirit between the parties and not really governed by the contract, it was something we had put aside and started to work"

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